

WHAT IS CLAIMED IS:

1. A reactive dye compound comprising:

- (a) at least one chromophore moiety;
- (b) at least one nitrogen-containing heterocycle
- (c) a linking group to link each chromophore moiety to each nitrogen-containing heterocycle;

characterised in that at least one nitrogen-containing heterocycle is substituted with at least one Y group wherein Y is a phosphonate or a borate derivative, preferably wherein the phosphonate group is selected from polyphosphonates having the formula -O-(P=O)(OH)R' wherein R' is a suitable nucleophile which is not OH.

- 2. A reactive dye compound according to Claim 1 wherein Y is derived from a phosphonate, preferably aceto diphosphonic acid.
- 3. A reactive dye compound according to Claim 1 or 2 wherein Y is -O-(PO)(OH)C(CH₃)(OH)(PO)(OH)₂.
- 4. A reactive dye compound according to any of Claims 1 to 3 wherein the nitrogen-containing heterocycle is selected from triazine, pyrimidine, quinoxaline, phthalazine, pyridazone and pyrazine.
- 5. A reactive dye compound according to any of Claims 1 to 4 wherein the nitrogen-containing heterocycle is selected from triazine, pyrimidine or quinoxaline.
- 6. A reactive dye compound according to any of Claims 1 to 5 wherein the nitrogen-containing heterocycle is selected from triazine and pyrimidine.
- 7. A reactive dye compound according to any of Claims 1 to 6 wherein the linking group is selected from NR, N(C=O)R, N(SO₂)R where R is selected from H or C1-C4 alkyl

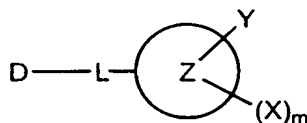
which can be substituted by halo, hydroxy, cyano, C1-C4 alkoxy, C2-C5 alkoxycarbonyl, carboxyl, sulfamoyl, sulfo and sulfato.

8. A reactive dye compound according to Claim 7 wherein the linking group is NR.

9. A reactive dye compound according to Claim 8 wherein R is H or C1-C4 alkyl, preferably H.

10. A reactive dye compound according to any of Claims 1 to 9 wherein the nitrogen-containing heterocycle is additionally substituted with one or more X substituents, wherein X is independently selected from Y and halogen.

11. A reactive dye having the formula (I):



wherein D is a chromophore group

L, Z, Y, X are as defined above and n is an integer of from 1 to 4;

and salts and esters thereof.

12. Use of a compound according to any of Claims 1 to 11 for dyeing cellulosic substrates, preferably cotton.

13. Use of a compound according to any of Claims 1 to 11 for dyeing wool.

14. Use of a compound according to any of Claims 1 to 11 for dyeing polyamide substrates, preferably nylon.

15. Use of a compound according to any of Claims 1 to 11 for dyeing silk.

16. Use of a compound according to any of Claims 1 to 11 for dyeing keratin, preferably hair.
17. Use of a compound according to any of Claims 1 to 11 for dyeing leather.
18. Process for the preparation of a compound according to any of Claims 1 to 11 comprising the steps of reacting a first starting material with a second starting material, the first starting material comprising at least one chromophore and at least one nitrogen-containing heterocycle which is attached to the chromophore group via a linking group L, the second starting material being a compound containing a Y group which is a phosphonate or borate group as defined hereinabove.
19. Process according to Claim 18 wherein the second starting material is aceto phosphonic acid.
20. Process according to Claim 18 or 19 wherein the process is carried out at a pH of from about 2 to about 8, preferably from about 3 to about 5.
21. Process according to any of Claims 18 to 20 wherein the second starting material is added to the first starting material slowly, preferably dropwise, preferably over several hours, preferably 1 to 5 hours, more preferably 1 to 3 hours.
22. Product obtainable by the process according to any of Claims 18 to 21.
23. A dye composition comprising the compound of any of Claims 1 to 11 or the product of any of Claims 18 to 22.
24. A dye composition according to Claim 23 wherein the composition is in the form of a solid mixture and further comprises an acid buffer.

25. A dye composition according to Claim 23 wherein the composition is in the form of a liquid and further comprises water and an acid buffer.
26. A dye composition according to Claim 23 wherein the composition is in the form of a paste and further comprises water, thickening agent and an acid buffer.
27. A dye composition according to Claim 23, 24, or 26 wherein the pH is preferably from about 2 to about 3.

1. The first part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as $\epsilon \rightarrow 0$. It is shown that the solutions of the system (1) converge to the solutions of the system (2) as $\epsilon \rightarrow 0$.